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EXAMINER
SILVER, DAVID

ART UNIT	PAPER NUMBER
2128	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	12/26/2006	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

	Application No.	Applicant(s)
Office Action Summary	10/051,820	WU ET AL.
	Examiner	Art Unit
	David Silver	2128

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>23 August 2006</u>.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>2-10,12-16 and 18</u> is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>2-10,12-16 and 18</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All   b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
   Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
   Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

1. This action is in response to a Request for Continued Examination filed 9/28/06.

2. Claims 2-10, 12-16, and 18 are currently pending in Instant Application.

Response to Arguments

3. Applicant's arguments filed 8/23/06 (RCE filed 9/28/06) have been fully considered but they are not persuasive for the reasons enumerated below.

Response: Objections to the Amendment

4. The Examiner thanks the Applicants for removing the objected-to new subject matter from the amendment dated 4/27/06. The Objections have been withdrawn.

Response: Claim Objections

5. Applicants are thanked for amending the claims in response to the claim objections. The objections have been withdrawn.

Response: Claim Interpretation

6. Applicants' remarks regarding the claim interpretation of pipe flow and link status have been reviewed and found persuasive.

Response: 35 USC 112 rejections

7. The Examiner thanks the Applicants for amending and/or canceling the new subject matter. The rejections have been withdrawn.

8. Based on the amendments, new grounds for 35 USC 112 first paragraph rejections are presented below.

Response: 35 USC 102/103 / Allowable Subject Matter

9. <u>Examiner Notes:</u>

In the previous Office Action claims 2-3 and 10-14 had new subject matter ("NSM"). The claims were also rejected under 35 USC 112 first paragraph for lack of written description of the NSM. The claims having the NSM were indicated to have allowable matter. The allowable matter was the NSM. Applicants have removed the NSM in response to the 35 USC 112 first paragraph rejections.

Therefore, the indication of allowable subject matter has been withdrawn.

Applicants argue:

"Applicant also notes that the Walters reference does not disclose, teach or suggest link status

being taking into account as a parameter for model calibration." **(Reply: page 14)**

Examiner Response:

In view of the Claim Interpretation and the explanation thereof it has been established that

Walters indeed discloses a link status being taking into account as a parameter because Walters

uses pipe flow, which is an equivalent thereof.

Rejection is maintained.

Claim Objections

10. Claim 18 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to

further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or

amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in

independent form. See MPEP 2111.04. The mere ability or optional suggestion does not necessitate

the performance of a function or the presence of a feature. In this instance the word "can" renders

the sole feature of the claim optional. The claim therefore fails to further limit its base claim.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:
Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

11. Claims 2-10, 12-16, and 18 are rejected under 35 U.S.C. 101 because the claimed invention is

directed to non-statutory subject matter.

MPEP 2106 recites, in part:
"...USPTO personnel shall review the claim to determine it produces a useful, tangible, and concrete result. In making this determination, the focus is not on whether the steps taken to achieve a particular result are useful, tangible, and concrete, but rather on whether the *final* result achieved by the claimed invention is "useful, tangible, and concrete." (emphasis added)

11.1   The method claims do not produce a useful, tangible, and concrete final result. The steps of the

method claims do not produce a useful, tangible, and concrete result. They merely recite a software

algorithm, per se, which, for example, does not display, store, or otherwise provide a useful tangible

output. Note exemplary claim 2 which only recites software steps and does not produce a useful

tangible and concrete **final** result. See MPEP 2106 [R-5] (partially recited above).

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:
The specification shall contain a written description of the invention, and of the manner and process of making and using
it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which
it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of
carrying out his invention.

The following is a quotation of the second paragraph of 35 U.S.C. 112:
The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject
matter which the applicant regards as his invention.

12. Claims 2-10, 12-16, and 18 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply

with the **enablement requirement**. The claim(s) contains subject matter which was not described

in the specification in such a way as to enable one skilled in the art to which it pertains, or with which

it is most nearly connected, to make and/or use the invention.

As per claim 3, the claim does not enable one of ordinary skill in the art to make and use the invention

because it does not enable weighting factors one of linear, square, square root or log function.

Specifically, the specification does provide a vague reference to this terminology but does **not** enable one

to make and use the invention. How are these functions applied?

As per claim 2, 10, and 12, the claims recites "optimized solutions", "top solutions", and "optimal

solution", respectively. This appears to be attempting to claim an optimal design model, which as

described below and admitted by Applicants in another publication, is not possible.

The authors of WaterCAD Version 5, which is owned by the Assignee of the Instant Applications have

admitted that it is impossible for a genetic algorithm to obtain one or more optimal solutions, see page

244 of "WaterCAD for Windows Version 5 User's Guide", by Haestad. Specifically section 10.2.8 which

discloses: "Given the fact that GA has no true test for optimality, after stopping a GA and producing a

particular result, there is always the possibility that if you run the GA again you may find a better

solution." The claims are therefore not enabled to use GA in order to determine an optimal solutions.

13. Claims 2-10, 12-16, and 18 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply

with the **written description requirement.** The claim(s) contains subject matter which was not

described in the specification in such a way as to reasonably convey to one skilled in the relevant art

that the inventor(s), at the time the application was filed, had possession of the claimed invention.

As per claim 2, 10, and 12 are rejected for failing to comply with the written description requirement

because the claim contains subject matter which was not described in the specification in a way as to

reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was

filed, had possession of the claimed invention because of the deficiencies enumerated above in the

enablement rejection of the instant claim. See enablement rejection above for the details which were not

adequately disclosed in the Specification.

Claims not specifically mentioned are rejected by virtue of their dependency.

Above rejections are merely exemplary; therefore, Applicants are required to fix all other similar

occurrences of the above-cited deficiencies.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under
this section made in this Office action:
A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale
in this country, more than one year prior to the date of application for patent in the United States.

14. Claims 2-5, 7-10, 12-16, and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by

Walters's "Calibration of water distribution network models using genetic algorithms".

Walters discloses: 2. A method of automatically calibrating a water distribution network, comprising the

steps of:

(A) selecting calibration parameters including link status and one or more of, pipe roughness and

junction demand **(Abstract. Note Claim Interpretation above, page 139 last para ... valve; page**

137 para 2 (section 4.4 para 1) ... partially closed valve);

(B) collecting field observed data including pipe flow measurement and a junction pressure

measurement for at least one point in the water distribution network, and including corresponding

loading conditions and boundary conditions that existed in the network when said field observed data

was collected **(page 135 last 2 paragraphs)**;

(C) generating a population of trial solutions that comprise a set of calibration results, using a

genetic algorithm **(page 132 para 3)**;

(D) running multiple hydraulic simulations of each trial solution to obtain a set of predictions of

pipe flows and junction pressures at selected points in the network, corresponding to the different

loading conditions and associated boundary conditions when the field observed data was collected

(Abstract; page 132 para 1-3 (emphasis on para 3), page 135 para 2);

(E) performing a calibration evaluation including computing a goodness-of-fit value for each

calibration solution based upon differences between field observed values and model simulated values

including flows and pressure head/water levels **(goodness of fit ... fitness on page 133 para 3)**; and

(F) searching for optimized solutions using said genetic algorithm and calculating goodness of fit

over the field data sets selected for a model calibration run and assigning a goodness of fit to each

solution into a genetic algorithm to search for optimized solutions **(page 134 para 1; page 137 para 2**

(Section 4.4)).

Walters discloses: 3. The method of automatically calibrating a water distribution model as defined in

claim 2, including the further step of:

(A) selecting a weighting function for at least one of said field observed data measurements, said

weighting function formulated as a weighting factor of observed pressure heads and flows **(page 133**

para 1; page 135 para 2); and

(B) selecting as said weighting factors one of linear, square, square root or log function of the

ratio of individual values for flow or hydraulic pressure to a sum of the observed values of flows or

hydraulic pressure **(page 135 para 2; page 133 para 1 and 3; page 134 para 3 "parameter**

tuning"); and

(C) applying said weighting function when running said calibration evaluation to determine said

goodness-of-fit value **(page 135 para 2)**.

Walters discloses: 4. The method of automatically calibrating a water distribution model, as defined in claim 2, including the further step of: selecting as said loading condition, at least one water demand loading at a predetermined time of day, corresponding to a time of day when a field observed data measurement has been made **(page 135 para 2 and last para, page 137 section 4.4 para 3)**.

Walters discloses: 5. The method of automatically calibrating a water distribution model, as defined in claim 4, including the further step of selecting multiple loading conditions representing demand loading at various times of day when field observed data measurements have been made **(page 135 para 2 and last para)**.

Walters discloses: 7. The method of automatically calibrating a water distribution model as defined in claim 2 including the further step of: after said optimized set of calibration data is obtained, making manual adjustments to this information for said water distribution model calibration **(page 134 para 3, abstract, page 135 para 2 and last para)**.

Walters discloses: 8. The method of automatically calibrating a water distribution network model as defined in claim 2, including the further step of performing a sensitivity analysis by varying model input parameters over a predetermined range and observing the response thereto of said model **(page 134 para 3)**.

Walters discloses: 9. The method of automatically calibrating a water distribution network model as defined in claim 8 including the further step of adjusting the collection of field observed samples based upon the results of said sensitivity analysis **(page 134 para 3)**.

Walters discloses: 10. A computer readable medium containing executable program instructions for automatically calibrating a water distribution model of a water distribution network that has links that include pipes and junctions, the executable program instructions comprising program instructions for:

(A) generating a graphic user interface by which the user may enter data concerning field observed data, demand alternatives and other information for the network **(page 133 para 2; Abstract; sections 2.1, 2.3, 3, 4.2, and 4.4)**;

(B) a calibration module configured to produce calibration information for a water distribution

model constructed from user-selected calibration parameters that include at least one of pipe roughness,

junction demand information, roughness groups, and link status **(page 133 para 2; Abstract;

sections 2.1, 2.3, 3, 4.2, and 4.4)**;

(C) a genetic algorithm module coupled to said calibration module and said user interface such

that information about said calibration parameters, and user-entered field observed data, including field

data that include calibration target data and boundary data, may be operated upon to produce a

population of trial solutions and said graphic user interface being configured to allow a user to select

goodness-of-fit criteria, a weighting functions, and one or more genetic algorithm parameters and a

number of top solutions that produce at least difference between the model simulated and field observed

values **(page 133 para 2; Abstract; sections 2.1, 2.3, 3, 4.2, and 4.4, note MPEP 2111.04

regarding statements such as "may")**; and

(D) a hydraulic network simulation module communicating with said genetic algorithm module

such that top solutions generated by said genetic algorithm module can be run by said hydraulic network

simulation module **(page 133 para 2; Abstract; sections 2.1, 2.3, 3, 4.2, and 4.4)**.

Walters discloses: 12. The computer readable medium as defined in claim 10, wherein said genetic

algorithm module further includes optimization programming that repetitively computes successive

generations of solutions based upon said fitness information calculated by said calibration module to at

least one optimal solution, and multiple top solutions being saved for each optimization calibration run

and all calibration settings and top solutions are kept in such a manner that said user can review and

retrieve calibration run previously performed **(page 133 para 2; Abstract; sections 2.1, 2.3, 3, 4.2,

and 4.4)**.

Walters discloses: 13. The computer readable medium as defined in claim 10 further comprising: a

database including information regarding water distribution networks for constructing models of said

networks, and into which information can be saved **(page 133 para 2; Abstract; sections 2.1, 2.3, 3,

4.2, and 4.4)**.

Walters discloses: 14. The computer readable medium as defined in claim 10 wherein said user interface further allows a user to enter information regarding alternative demand loadings, representing a demand for water supply at a given point in time, at a given location in the network **(page 133 para 2; Abstract; sections 2.1, 2.3, 3, 4.2, and 4.4)**.

Walters discloses: 15. A method as described in claim 2 wherein link status is a status of being opened or closed of one or more of pipes, valves and, as being on or off for pumps, in the water distribution model of the water distribution network that is being calibrated **(page 133 para 2; Abstract; sections 2.1, 2.3, 3, 4.2, and 4.4)**.

Walters discloses: 16. The method as defined in claim 2 further comprising the step of: computing a roughness value, roughness multiplier and identifying link status **(page 133 para 2; Abstract; sections 2.1, 2.3, 3, 4.2, and 4.4)**.

Walters discloses: 18. The system as defined in claim 10 wherein a calibration run can be terminated to determine intermediate values, and can be paused and resumed **(inherent see MPEP 2111.04 and claim interpretation above)**.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

15. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Walters's "Calibration of water distribution network models using genetic algorithms" in view of Official Notice taken.

As per claim 6, Walters discloses: The method of automatically calibrating a water distribution model as defined in claim 1 wherein said boundary conditions include pressures control valve settings and pump

operation speeds **(page 139 last para; page 140 first para)**. Walters however does not expressly

disclose that the boundary conditions include water storage tank levels. Official Notice is taken with

respect to this limitation. It would have been obvious to one of ordinary skill in the art at the time of

Applicant's invention to combine the references in order to have a more detailed and realistic model that

would encompass more variables on the boundary conditions. This motivation and feature is displayed in

ATSDR's "Summary of Findings" **(page 2 para 1)**.

Conclusion

16. All claims are rejected.

Any inquiry concerning this communication or earlier communications from the examiner should

be directed to David Silver whose telephone number is (571) 272-8634. The examiner can normally be

reached on Monday thru Friday, 10am to 6:30pm. If attempts to reach the examiner by telephone are

unsuccessful, the examiner's supervisor, Kamini Shah can be reached on 571-272-2279. The fax phone

number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application

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866-217-9197 (toll-free).

David Silver
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KAMINI SHAH
SUPERVISORY PATENT EXAMINER